THE MYXOS OF MIDDLESEX,

BY

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The Myxos of Middlesex.

BY PROFESSOR JOHN DEARNESS, LONDON.

WHY should anyone be interested in the Slime-moulds? Are they of any use? In the ordinary sense of the word—No. Do they injure any useful thing? Excluding the few species of the probably allied Phytomyxineae they are not injurious to anything of economic importance.* But if beauty is its own excuse for being, they certainly have a valid *raison d'etre ;* and if forcing upon thoughtful minds problems that are at once unique, interesting and difficult is a mental stimulant, then they may share a claim to utility with those plants that provide satisfaction for the physical appetite.

These organisms, Myxomycetes, or Myxogasters, or Mycetozoa—Myxos will do for short—what are they anyway? Are they plants or are they animals? Some biologists say Both ; others say Neither. But paradoxical as it may seem it is hardly disputed that they are animals in their vegetative stage, called the plasmodium, and plants in their reproductive stage, called usually the sporangium. The reader is probably familiar with the form and movements of the common amoeba. Let him imagine a coalescence of a swarm of amoebae—a plasmodium—rhythmically flowing hither then thither, creeping in and out among the interstices of rotting wood, decaying straw or other organic substances—selecting, engulfing, and digesting suitable food materials ; spreading out when food runs low to discover pastures new, and passing a message along the lines when the discovery is made to gather in a mass at the table.

* Usu in vita communi parum admodum sese commendant, sed in oeconomia naturae certe non spernendi. Multa insectorum genera ex eorum sporidiis unica capiunt nutrimenta. FRIES Systema Mycologicum III, p. 74.

For the reason already stated, this assembling and feasting is usually concealed but in the history of the majority of these plasmodia there comes a stage of maturity or a condition of environment of the plasmodia moving them to enter a protected resting state or to emerge into the open air to spread over the surface of the matrix or to climb up the sides of contiguous plants or stems where they pass into aethalia or sporangia and become masses of dusty spores.

To the transitional stage, often a quite conspicuous one resembling beaten egg, or dirty honey or blood stained mucilage, the novice is more apt to experience aversion than any other feeling. It was this stage that suggested their commonest name—slime-moulds. But let him wait—I was going to say a minute—to observe the wonderful transformation. Different species follow different methods. Some of them build spore houses of many adjoining rooms, others spread out and in separated plasmodia develop into little tops or balls or lenses the prettiest conceivable, and still others creeping up leaves of grass or stems of plants or sides of stumps or trees resolve into rows of almost microscopic puff-balls. Many of them are more beautiful than the uninitiated can imagine until they have examined with the microscope the iridescence of their walls or the delicate lacework of their internal structure. After making such an examination the mind must be a dull and unimaginative one indeed if it does not become curious to know something of the life-history of these beautiful and curious little animal-plants.

It would make too long a story to summarize here the observations of De Bary, Cooke, Schroeter and many other students of the order. I can specially commend to readers who have access to the Annals of Botany a paper by Arthur Lister in Volume II, 1888. Anyone who begins to read the article will surely peruse it to the end. That observer kept plasmodium of a species of Badhamia under fairly continuous observation for a year at a time. One might almost say he trained it to come to be fed. He found out at least certain kinds of food it preferred to other kinds. A plasmodium that he had confined several days in a glass box had spread itself out over the clean glass in a widely meshed network of narrow lines. "To a point", he writes, "on the upper edge of the net-work I applied a thin pulp of the scraped hymenium of Stereum (a common fungus). There was at

first, as I have not infrequently seen, a shrinking backwards of the margin of the network, as if notice of the presence of a food-supply had been sent off to the more distant parts ; then came on a quick stream and in a quarter of an hour the whole side was pouring up its plasmodium with astonishing rapidity. The wide meshwork was not sufficient to conduct the abundant supply and fresh veins started off in all directions . . they rushed across the field of the microscope at a speed that was truly amazing . . . New veins were crossing and recrossing the wide network in every direction and in a few minutes it was converted into a film of rapidly moving plasmodium, perforated with small openings ending in an opaque mass which overspread the food-pulp . . . It was a sight not soon to be forgotten ; the marvellous exhibition of such active life in so low an organism was most impressive."

Once a start in the study of these forms is made, the student who is moderately expert in the use of the microscope will find it more interesting to observe the organisms themselves than to read about them. In the season, say from July or August until October, it is safe to say that there is not a ten-acre block of mixed woods in this Province which will not afford the seeker one to several interesting species. At a meeting of the Microscopical Section I once had the pleasure of exhibiting eight species that I found on a single decaying basswood.

My own collection contains over a hundred kinds but the following list includes only those collected in the townships of the eastern half of the county. To these are to be added several species not yet satisfactorily determined. The majority of those named were at some time submitted to the late Mr. J. B. Ellis, the late Mr. A. P. Morgan or Dr. Peck for correction or verification. Bibliographical assistance on the taxonomy was obtained chiefly from Fries "Systema," De Bary's "Mycetozoa," Peck's Reports, Morgan's "Myxomycetes of the Miami Valley," and McBride's "Myxomycetes of Eastern Iowa."

The names employed are chiefly Rostafinski's as these seem to be in most common use. It is said that the application of the law of priority would displace most of them. Some of the common species carry a score or more of synonyms ; *Physarum sinuosum*, for example, has twenty-six and *Fuligo varians* twenty-seven.

It may be said to the intending collector that the sporangial stage is as easily preserved as the mosses. A layer of the wood or stratum upon which the sporangia form must be lifted with them and when this becomes dry it may be glued into the top or bottom of a shallow pill-box. Care has to be taken in most cases to avoid the crushing of the extremely delicate fructifications. The few that happen to be too tall for a ¼ to ⅜ inch pill-box may be glued in with their sides parallel to the bottom of the box. In the herbarium I have never seen them attacked by insect pests.

The MYXOMYCETES are a group of organisms of obscure genetic relationship. They may be characterized in brief as fungus-like organisms destitute of mycelium, producing from resting spores amoeba-like swarm-spores which increase by division and finally aggregate or fuse into masses of protoplasm called plasmodia which develop resting-spores. By many they are regarded as animals and are called "Mycetozoa."

They are usually classified into one order of parasites on living plants and two orders of saprophytes—the Acrasieae consisting of incompletely fused zoospores and Myxogasters in which the plasmodium consists of completely fused zoospores.

Species of the last order only are named in the following list:

Spores exposed: No. 1.

1. *Ceratiomyxa mucida* (Pers.), white or watery-white; no mycelium. Common on wet, rotten wood in hot weather.

Spores enclosed in sporangia: Nos. 2-51.
Lacking capillitium: Nos. 2-7.

2. *Licea biforis*, Morgan, n. s. I found this on dead black ash near Granton in 1892, and sent it to the late A. P. Morgan who published the description in the following year. The sporangia, but for the color, which is bright yellow-brown, suggest the oyster-shell bark-louse. The dark yellow, globose spores are 10-11 microns in diameter.

3. *Licea variabilis*, Schrad. Dull red to black, spores yellow, rough, 14 mic.

4. *Tubulina cylindrica*, Bull. Spores rusty. The aethalium which may be as large as a dime or larger passes through a bright red stage which is very attractive.

5. *Lindbladia effusa* (Ehr.) A doubtful determination.

6. *Enteridium rozeanum*, Wingate. Aethalia large ½-1½ inches broad, shining, brown ; occasionally common.

7. *Dictydium umbilicatum*, Schraed. A delicate species, 2 mm. high. The thin parts of the wall break away, leaving the spores in a pretty little stalked basket.

Possessing capillitium—more or less complicated, sometimes very beautiful network that lines the walls of the peridium or traverses its interior—Nos. 8-51.

Lacking both columella and lime deposits—Nos. 8-30.

Capillitium even, not thickened—Nos. 8, 9.

8. *Perichaena corticalis*, Batsch. Like half-ripe small mustard seed, under the lens a beautiful species. My specimens are all on black ash bark. Spores yellow.

9. *Perichaena depressa*, Lib. Peridia larger, flatter and more irregular than No. 8.

Capillitium thickened irregularly—Nos. 10-19.

10. *Oligonema nitens*, Lib. Shining, crowded, minute sporangia. Not rare.

11. *Oligonema brevifilam*, Peck. Very short elaters.

12. *Lachnobolus* (may be *circinatus*, Schraed). Capillitium springing from the walls of the peridium.

13. *Arcyria punicea*, Pers. Not rare. Conspicuous by its color, often bright red. A small, ovoid sporangium raised on a 2 mm. stipe.

14. *Arcyria cinerea*, Bull. Capillitium rises out of the ruptured peridium as a pale or ashy-yellow network.

15. *Arcyria pomiformis*, Roth. Spinulous capillitium.

16. *Arcyria nutans*, Pers. Cylindric; long yellow plume-like capillitium. Common.

17. *Arcyria incarnata*, Pers. Crowded ; capillitium pink.

18. *Lycogala epidendrum*, Buxb. The best known myxo. It emerges from decaying wood in scarlet masses from the size of a pea to a small marble, turning gray-brown as its matures, and finally scattering its spores after the manner of a puff-ball.

19. *Lycogala exiguum*, Morgan. Small, minutely scaly. Found only once.

Capillitium (elaters) spirally thickened—Nos. 20-30.

20. *Trichia fallax*, Pers. Shining, olive-brown, stipitate, pear-shaped; Spores and elaters yellow,

21. *Trichia varia*, Pers. Pale, variable in size, two spirals on smooth elaters. Very common.

22. *Trichia chrysosperma*, Bull. Elaters and spores in mass golden yellow. Common.

23. *Trichia affinis*, De Barry. Elaters spinulous banded, enlarged behind the acute tips. Spores angular.

24. *Trichia incarnata*, Pers. The reddest Trichia in the collection.

25. *Trichia scabra*, Rost. Elaters long, spinulous, yellow.

26. *Hemiarcyria rubiformis*, Pers. Ruby-red or brownish-red throughout—plasmodium, sporangium, capillitium, spore-mass. A common and attractive species.

27. *Hemiarcyria Ellisii*, Mass. Similar to No. 26; spores rougher.

28. *Hemiarcyria serpula*, Scopoli. Vermiform, bright yellow, not rare in the early fall.

29. *Hemiarcyria clavata*, Pers. Sporangia somewhat pear-shaped, or club-like; stipitate yellow.

30. *Hemitrichia vesparium*, Batsch. Similar to No. 26 but sessile and the threads are yellowish.

Possessing columella—an extension of the stipe into the sporangium—lacking lime deposits; capillitium not tubular—Nos. 31-35.

31. *Reticularia umbrina*, Fr.—*R. Lycoperdon*, Bull. Externally similar to No. 6.

32. *Comatricha typhina*, Rost. Peridium disappears. Branching columella and capillitium rise in delicate vertical plume. Spores violet.

33. *Stemonitis fusca*, Rottr. This and the next raise into the air their beautiful, delicate, sometimes nodding plumes.

34. *Stemonitis maxima*, Schw.

35. *Stemonitis ferruginea*, Ehr. The stipe looks like a bit of maidenhair stem. Spores brown. Mr. Ellis named a very similar specimen which I collected at Ilderton, *Stemonitis herbatica*, Peck.

Lime deposits in other parts but not in capillitium: columella present—Nos. 36-37.

36. *Diachaea leucopoda*, Bull. Beautifully tinted sporangia on white stipes. Spores violet.

37. *Spumaria alba*, Bull. The whitish, slimy plasmodium often seen strung along grass stems, changing at maturity into bluish gray or blackish masses of spores.

Lime crystals in the capillitium; columella inconspicuous or absent—Nos. 38-42.

38. *Didymium farinaceum*, Schrad. Sporangium deeply umbilicate at base; stipe dark.

39. *Didymium squamulosum*, A. and S. Wall carrying a layer of lime crystals; stipe white.

40. *Chondrioderma spumarioides*, Fr. Lime-covered wall, sessile; spores violet.

41. *Chondrioderma crustaceum*, Peck. Outer limey wall separable from inner iridescent one. Spores very dark-violet.

42. *Chondrioderma Michelii*, Lib. Umbilicate below, sometimes above also; the stipe standing on a circular disc.

Capillitium and usually walls with non-crystallin lime deposits: spores violaceous—Nos. 43-51.

43. *Cienkowskia reticulata*, A. and S. Capillitium with hooked branchlets. Spores violet.

44. *Tilmadoche viridis*, Gmelin. Sporangium nodding, flattened, greenish yellow.

45. *Leocarpus fragilis*, Dicks. Sporangia look like smooth, brownish insect eggs attached by their ends to white, short, thread-like stems.

46. *Craterium leucocephalum*, Pers. Sporangia little cups with a flattish lid-like covering Mostly on dead leaves.

47. *Craterium minimum*, B. and C. Minute, whitish to yellowish cylinders or deep wine cups with convex, circumcissile lid. Common.

48. *Physarum nutans*, Pers. Lenticular sporangia on relatively long bent or top-curved stipes.

49. *Physarum cinereum*, Batsch. Sporangia sessile, relatively large.

50. *Physarum sinuosum*, Bull. The sinuous, ashy-gray, fructification suggests a miniature fort. It is said to be rare but I have observed it quite frequently.

51. *Fuligo septica*, (L.) Gmelin—*Fuligo varians*, Sommerf. This seems to include *Fuligo rufa*, *F. violacea* and *F. flava*. Its yellowish or reddish plasmodium—"flowers of tan"—is the most conspicuous one in the list. I have seen a decaying stump end nearly covered with it, spreading in an irregular circle eight to ten inches in diameter like a thick, rough omelet. In some parts of the county the children used to call it "snake-poison." It matures into a mass of purplish black spores. When these are scattered by the wind there is left a noticeable hypothallus marking the area covered by the spore mass.

The Plant Formations of the Bruce Peninsula.

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THE Bruce Peninsula lies between Lake Huron and Georgian Bay. It is composed of limestone of the Clinton, Niagara and Guelph formations, the Clinton forming high bluffs on the Georgian Bay side. Towards the base of the Peninsula, the Lake Huron shore is low and sandy, becoming more rocky to the north. Near the base are several small lakes, some of which are connected into a chain by rivers.

Phytogeographically the flora is an interesting one, for while it is in the main Alleghanian there are some Carolinian (southern) forms on the western shore, and also some western forms on this shore and at other points on the Peninsula.

The field work upon which these notes are based extended over a a period of six years and included all seasons of the year from April to January. This work may be divided into two parts—first a